



Tech Fact

DOW FILMTEC™ membranes

FILMTEC FORTILIFE™ elements – Strongly support FGD wastewater ZLD & crystal salt reclamation project of Guodian Hanchuan power plant

Project information:

Location:

Hubei Province, China

Purpose:

FGD wastewater ZLD of power industry

Performance:

Successfully support FGD wastewater ZLD and crystal salt reclamation

China Guodian power group is one of the five largest power groups in China. Guodian Hanchuan power plant has operated since 1987 on the bank of Han river in central China. Through three phases of engineering construction, Guodian Hanchuan power plants now owns 6 coal fired power units, 4 with 300 MW capacity and 2 with 1000 MW capacity for a total of 3200 MW installation capacity.

Beijing Lucency enviro-tech Co. Ltd, Nanjing branch (Simplified as Nanjing Lucency in the following parts) is a subsidiary of Guodian Technology & Environment Corporation. Nanjing Lucency has investigation & engineering design, construction, and operation capability in the water treatment technology as well as its extended value chain. To date, Nanjing Lucency has completed more than 200 projects in the power plant supply water treatment and industrial wastewater treatment.



Figure. The bird view of Guodian Hanchuan power plant (Photo provided by Beijing Lucency enviro-tech Co. Ltd, Nanjing branch)

Background information

Coal is one of the most important energy resource in China's energy security strategy. The coal-fired power plants provide more than 60% of the power supply in China. However, the sustainable use of coal-fired power plants has caught the attention of environmental protection agencies and regulations are being put into place to protect the air and water resources. Under the threat of acidic rainfall, the flue gas desulfurization is widely applied by coal-fired power plants to control sulfur dioxide emissions. Among all the sulfur dioxide capture technologies, the wet scrubber is widely selected due to the good compatibility with various coal resources, maturity of process technology and reliability of daily operation. However, in order to maintain an effective composition in the wet scrubber, to avoid corrosion and to guarantee an adequate product quality of the produced gypsum, a stream of wastewater is purged from the scrubber (aka. FGD Wastewater). The purged stream has traditionally been treated using coagulation and precipitation by dosing chemicals into three sedimentation tanks installed in-series, and then discharging the wastewater according to local discharge standard, as shown in Figure below.

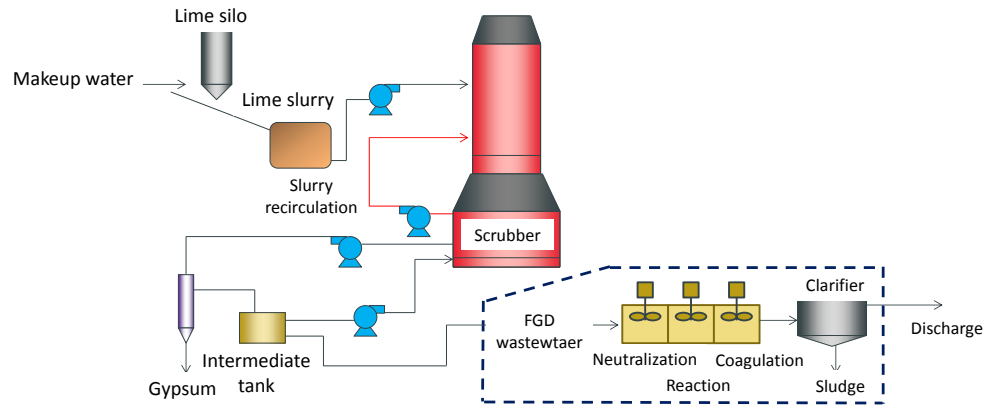


Figure. A typical treatment process of FGD wastewater.

Case analysis

In the recent years, the zero liquid discharge treatment of FGD wastewater is emerging. As the general EPC (Engineering Procurement Construction) contractor for Guodian Hanchuan power plant's FGD wastewater ZLD project, Beijing Lucency enviro-tech Co. Ltd, Nanjing branch was one of the pioneers to investigate the ZLD treatment process of such high salinity challenging wastewater. This FGD wastewater treatment plant is the first to employ ZLD for China's 1000 MW power unit level. It is also the first coal-fired power plant to employ ion separation technology in the wastewater treatment to provide salt recovery for reuse. It showcases the ability to successfully achieve ZLD when treating FGD wastewater and also to minimize the solid wastes residue left by the ZLD process.

Before the industrial project started-up, Dow Water & Process Solution closely collaborated with Nanjing Lucency to conduct on site pilot trials in order to determine which product were best suited for the application. From the pilot demonstration, the decision was made to install the following elements in the commercial process: DOW FILMTEC FORTILIFE™ XC-N nanofiltration elements for ion separation of the FGD wastewater; DOW FILMTEC FORTILIFE™ XC80 reverse osmosis elements for salt concentration and volume reduction of FGD wastewater; and DOW FILMTEC™ BW30-400 for permeate water polishing. Not only was the power plant able to benefit from the reusable water, but the purity of crystallized salt from wastewater ZLD process achieved engineering design expectations and was more than 98.5%. This level of purity satisfies the requirement for Industrial Grade I salt purity as stated in the industrial salt standard (GB5462-2003).

Table. The nanofiltration / reverse osmosis elements in Guodian Hanchuan power plant FGD wastewater ZLD project

	Product type	Element (pcs)
NF	FILMTEC™ FORTILIFE™ XC-N	80
RO	FILMTEC™ FORTILIFE™ XC80	78
BWRO	FILMTEC™ BW30-400	36



Figure. Nanofiltration / reverse osmosis system and crystalized salt photo(Photo provided by Beijing Lucency enviro-tech Co. Ltd, Nanjing branch)

Reference

[1] <http://www.nj-china-lucency.com/newsview.asp?id=316&pic=2>

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